First report of Tomato leaf curl Bangladesh virus (ToLCBV) infecting Gomphostemma niveum plants in Assam, India

S. Datta*, R. Budhauliya, B. Das, S. Chatterjee, A. Bora, M.G. Vairale, H.K. Gogoi and Vijay Veer

Molecular Virology Laboratory, Defence Research laboratory (DRDO), PO Bag No.2, Tezpur, Assam, 784001 India

E-mail: sndatta1978@gmail.com

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Gomphostemma niveum (Lamiaceae), is an important herbaceous, perennial plant of ethnopharmaceutical importance in northeastern India (Sathe & Kaushik, 2009; Sathe et al., 2010; Dutta, 2014). To date, no report is available on pathogens infecting plants of this genus. We here report tomato leaf curl Bangladesh virus (ToLCBV) in *G. niveum* plants exhibiting stunted growth, vein clearing, thickening, crinkling, yellowing, and downward curling of leaves (Fig. 1). During a survey in 2010, 10 leaf samples from six *G. niveum* plants showing these symptoms and four symptomless plants were collected from laboratory experimental fields.

Total DNA was extracted from all the samples and subjected to rolling circle amplification (RCA) followed by BamHI restriction digestion. Subsequently, a PCR was done using primer pairs DengA/DengB, BF518/BR1641 and Beta01/Beta02 for amplification of DNA-A, DNA-B and DNA-β respectively (Reddy et al., 2005). DNA extracts from symptom-bearing plants showed expected size PCR amplicons with DengA/DengB (~0.5 kb including V2 gene of DNA-A) and Beta01/Beta02 (~1.3 kb including SC1 gene of DNA-B). DNA from symptomless plants did not yield these amplicons. Attempts to amplify a DNA-B failed repeatedly, suggesting the virus to be monopartite and associated with a betasatellite.

Two amplicons of DNA-A and DNA-β were randomly selected and directly sequenced (GenBank Accession Nos. KP118992, KP118991, respectively).

A search for homologous sequences in GenBank revealed the closest homology of the *G. niveum*-related partial DNA-A sequences with Tomato leaf curl Bangladesh virus (ToLCBV) in *G. niveum* plants exhibiting stunted growth, vein clearing, thickening, crinkling, yellowing, and downward curling of leaves (Fig. 1). During a survey in 2010, 10 leaf samples from six *G. niveum* plants showing these symptoms and four symptomless plants were collected from laboratory experimental fields.

Taken together, our finding of ToLCBV in *G. niveum* plants with typical symptoms, signifying persistent natural infection, is a new record. Although the possibility of a new viral genome created by DNA recombination remains to be explored, the detected monopartite virus differed significantly from previously reported bipartite begomovirus causing leaf curl disease in tomato plants from nearby regions (Reddy et al., 2005). Interestingly, the *G. niveum* identified ToLCBV DNA-A was associated with the ToLCBV betasatellite. This data contrasted with the detection of tobacco curly shoot virus (ThCSV) DNA-A (KP143684) being associated with tomato leaf curl virus (ToLCV) DNA-β (KP143683) in symptomatic tomato plants, grown in the same experimental field, during 2010 (Datta et al., unpublished). In conclusion, we report *G. niveum* as a natural host of ToLCBV and an interesting molecular epidemiology of begomovirus in this part of India.

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References


Figure 1


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